

Part II, Sub-Part 1:

Steel Reinforcing Bars and Steel Dowel Bars - 12

SCOPE: This sub-part provides procedures for being included on the Qualified Manufacturer List (QML) as a Fabricator of steel reinforcing bars and dowel bar for CDOT projects. CDOT will only accept steel reinforcing bars and dowel bars from a Fabricator on the QML.

CDOT will accept steel reinforcing bar suppliers who have both participated in AASHTO's NTPEP (National Transportation Product Evaluation Program) audit program of steel rebar and have received evaluation results deemed acceptable to CDOT. A letter must be addressed to CDOT's Product Evaluation Coordinator (PEC) requesting that the facility be placed on the CDOT's QML. A copy of the NTPEP Certificate of Compliance as well as any applicable documentation from the audit reports is required. CDOT may request additional information if necessary and may decertify a supplier for failing to meet CDOT expectations.

1. REFERENCED DOCUMENTS

Where applicable, the latest edition of the following standards shall be considered a part of these requirements.

1.1 CDOT Standard Specifications for Road and Bridge Construction:

- Section 412.13 – Joints
- Section 602 – Reinforcing Steel
- Section 709.01 – Reinforcing Steel
- Section 709.03 – Dowel Bars and Tie Bars

1.2 AASHTO Standards:

AASHTO M 31 – Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement

AASHTO R 38 – Standard Practice for Quality Assurance of Standard Manufactured Materials

AASHTO T 244 – Standard Method of Test for Mechanical Testing of Steel Products

AASHTO M 55 – Standard Method of Test for Steel Welded Wire Reinforcement, Plain, for Concrete

AASHTO M 221 – Standard Method of Test for Steel Welded Wire Reinforcement, Deformed, for Concrete

1.3 ASTM Standards:

ASTM A 184 – Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement

ASTM A 370 – Standard Test Methods and Definitions for Mechanical Testing of Steel Products

ASTM A 615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

ASTM A 706 – Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

ASTM A 996 – Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement

ASTM D 3665 – Standard Practice for Random Sampling of Construction Material

2. TERMINOLOGY

2.1 See AASHTO M 31 and ASTM A 370 for terminology related to steel reinforcing bars and dowel bars.

2.2 Coating Application Plant – The one who produces a protective coated steel reinforcing bar and a protective coated dowel bar.

2.3 Contractor – The company under contract with CDOT to produce products using steel reinforcing bars and dowel bars.

2.4 Deformed bar – Steel bar with protrusions; a bar that is intended for use as reinforcement in reinforced concrete construction.

2.5 Fabricator – The company, which cuts and bends steel reinforcing bars either coated or uncoated and/or assembles dowel bar baskets. The company may also provide uncut lengths of steel bar to the construction project site. Each plant constitutes a separate company.

2.6 Plain bar – Steel bar without protrusions; a bar that is intended for use as a dowel bar in transverse joints of concrete pavement construction.

2.7 Supplier – In this sub-part supplier shall be defined as one who produces or mills uncoated deformed steel reinforcing bars and steel plain bars used by the Fabricator.

2.8 Uncoated bar – Steel bar without protective coating.

2.9 Cement and Concrete Reference Laboratory (CCRL) Laboratory Inspection Program – Provides a comprehensive account of how procedures, practices, equipment and facilities compare with ASTM standards requirements. The CCRL laboratory inspector: checks critical equipment dimensions and operating characteristics, watches a technician demonstrate test procedures, and reviews the quality system when covered by appropriate ASTM standards.

3. SIGNIFICANCE AND USE

3.1 This Standard specifies requirements that should be followed by the Supplier in implementing an effective Quality Control (QC) system. This is accomplished by a certification system that evaluates quality control practices and specification compliance tests performed by the Supplier according to their quality control plans.

3.2 This Standard specifies requirements and procedures for a certification system that shall be applicable to all Suppliers providing steel reinforcing bars and dowel bars.

3.2.1 This Standard covers the responsibilities of the Supplier from point of delivery of steel reinforcing bars and dowel bars to the Fabricators plant, construction project site, and/or Coating Application Plant.

4. SAMPLING

4.1 All number and frequency of test samples required by this Standard shall be in accordance with AASHTO M 31 and ASTM A 996 (as a minimum) and the enhanced Manufacturer QC program. It is expected that the QC tests are to be tied to critical production processes as well as to the final product.

4.2 In addition, the QC program required by this Standard shall use stratified random sampling techniques. Stratified random sampling should be performed in accordance with ASTM D 3665. The use of a stratified random sampling procedure is mandatory to the establishment of a valid QC program. All random QC sample locations shall be properly documented.

NOTE 1: Determination of random locations (or timing) is universally applied to a construction site or to a Fabricator production line. ASTM D 3665 covers a flowing stream of material that can be applied to the production line of steel reinforcing bars and dowel bars.

5. TESTING REQUIREMENTS

5.1 An internal designated testing location and/or facility of a Supplier that performs the required testing under this Standard shall be identified in the submitted Quality System Manual (QSM) (per Section 9).

5.1.1 A copy of the certification of national accreditation program such as CCRL shall be reproduced in the submitted Quality System Manual (QSM) (per Section 9).

5.2 Testing required for this Standard shall be performed by qualified Supplier personnel through appropriate QC programs or appropriate training programs.

5.3 As a minimum, the Supplier's programs used shall include the following;

5.3.1 Training in AASHTO or ASTM test procedures.

5.3.2 Demonstration of proficiency in each Supplier's QC test.

5.3.3 Demonstration of ability to properly document Supplier's QC test results.

5.3.4 Demonstrate the ability to interpret all the test results.

6. SUPPLIER REQUIREMENTS

6.1 Uncoated bar Suppliers shall be on CDOT's Qualified Manufacturers List (QML) prior to use by the Fabricator. The QML can be found at the following web address www.coloradodot.info/business/APL/.

6.2 The uncoated bar Supplier shall provide an annual certification that all steel products delivered to the Fabricator and/or Coating Application Plant / Fabricator and permanently incorporated in the work shall have occurred in the United States of America.

7. CERTIFICATION

7.1 This section details the required documentation and samples to be submitted to the CDOT by the Supplier requesting to be added to the QML.

7.2 A brief outline of the procedures used to evaluate the finished product including: sampling and testing frequency, sample preparation methods, chemical analysis methods, and physical testing methods.

7.3 The results of all applicable chemical and/or physical tests required by ASTM A 615 on the most recent 40 samples (20 pairs) tested. The results shall be submitted in the format outlined in ASTM A 370.

7.4 A copy of the CCRL certification for the laboratory performing testing.

7.5 A copy of the reinforcing steel Supplier's Quality System Manual, which complies with the requirements of Section 9.

7.6 A sample of the proposed reinforcing steel at least 3 foot in length shall be shipped to

the Concrete and Physical Properties Program at the Materials and Geotechnical Branch, 4670 N. Holly Street, Unit A, Denver, CO 80216-6408.

7.7 The reinforcing steel Supplier shall allow CDOT to visit the production and/or shipping site to observe the reinforcing steel Supplier's quality control activities, to inspect the facilities, and to obtain samples for tests.

7.8 The reinforcing steel Supplier shall follow the procedures described in the CDOT approved quality system manual.

7.9 The reinforcing steel Supplier shall establish a continuing test record for every test required for each Type of reinforcing steel included in the written request.

7.10 The reinforcing steel Supplier shall submit to CDOT all reports required by this standard in a format approved by CDOT.

7.11 The reinforcing steel Supplier shall have a satisfactory record of compliance with CDOT project specifications. Decisions by CDOT concerning this requirement shall be based on the test results furnished by the Reinforcing Steel Supplier and satisfactory results when field samples are tested.

8. DECERTIFICATION

8.1 CDOT may decertify the Fabricator when conditions exist as specified on page 2 of CP 11 (Section 5 – Decertification).

NOTE 2: The term Supplier and Fabricator are interchangeable when reading Section 5 – Decertification on page 2.

9. SUPPLIER'S QUALITY SYSTEM MANUAL (MINIMUM REQUIREMENTS)

9.1 On an annual basis, at a minimum of one month prior to producing steel reinforcing bars and dowel bars for a CDOT project, one copy of the Supplier's Quality System Manual (QSM) shall be submitted for review and approval to CDOT's Product Evaluation Coordinator either at 303-398-6566 or within the Staff Materials & Geotechnical Branch at 4670 North Holly Street,

Unit A, Denver, Colorado 80216. In lieu of a hard copy QSM, an electronic PDF document may be submitted. The PDF'ed manual submittal must be complete and whole. CDOT's approval of the QSM is intended only to indicate that the QSM is in conformance with the minimum QC requirements set forth in this Standard. Once the Supplier is approved and on the QML, the QSM provisions will remain in effect for a period of one year, unless revisions are determined to be necessary by the Quality Control Manager or requested by CDOT, or if the Supplier is decertified. If any changes are made to the QSM, an updated copy shall be submitted to CDOT for review and approval. In lieu of a full updated copy, submittals of updates are acceptable. Updates shall be in the same format as the manual and are to be inserted into the manual to replace outdated pages. The updates may be in PDF format. The updated pages will have the date of update issuance and is to be recorded in a table of revisions. Guidelines for preparing a QSM are documented in AASHTO R 38.

9.2 The Supplier's QSM may be maintained in electronic format. However, one or more copies of the QSM shall be maintained by the Supplier's QC Manager in a printed and bound format. The QSM shall be available to all of the Supplier's employees. Each document in the QSM shall indicate its preparation date and all pages of the QSM shall be numbered. If a document is revised, the date of revision shall be indicated on the document and recorded in a table of revisions.

9.3 The Supplier's QSM shall be formatted to provide numbered sections which meet the following order, format and content:

9.3.1 Supplier's quality policy or mission Statement endorsed by the company's Chief Executive Officer.

9.3.1.1 The quality policy / mission statement shall indicate support of top management to enforce the QC requirements contained in the QSM.

9.3.2 The QSM shall include the address and telephone numbers of applicable personnel at the supplier facility.

9.3.3 The QSM shall include a brief listing and description of all the steel reinforcing bars and dowel bars being fabricated at the facility.

9.3.4 The QSM shall present and define any significant terms used throughout the QSM.

9.3.5 For all fabricated items addressed in the QSM, the applicable AASHTO, ASTM, specification shall be identified.

9.3.6 The QSM shall present the personnel structure established to implement the Supplier's quality system. The specific roles and responsibilities of all QC personnel shall be documented as follows:

9.3.6.1 The QSM shall contain an organizational chart. The chart shall indicate a clear separation between the QC personnel and the production personnel. The QC Manager shall be allowed direct access to top management, independent from production.

9.3.6.2 Each facility shall have a Quality Control Manager who has the overall responsibility for implementing the requirements of the QSM. The QC Manager shall review the established QC system annually in order to satisfy this requirement, or if changes in the fabrication process(s) occur, or whenever technical or CDOT information indicate a trend in reduced quality.

9.3.6.3 Each facility shall have at least one Quality Control Technician to perform QC sampling, testing, and inspection. At least one QC Technician shall be on-site during production. The QC Technicians shall be familiar with the tests they perform and have sufficient authority to assure corrective actions are carried out when necessary. The QSM shall indicate the line of authority of the QC Technicians, which shall demonstrate their authority to require corrective action. The QSM shall designate the QC Technicians at the facility and laboratory involved in the production or testing of the steel reinforcing bars and dowel bars.

9.4 The QSM shall contain a description of the qualifications required and attained, as well as the years of experience for each QC Manager and QC Technician. All QC sampling, testing, QSM shall also include periodic auditing of each QC Technician's ability to satisfactorily perform the required tests. Retraining shall be provided when the test method is revised.

9.5 The QSM shall provide for specific training for frontline production personnel in the safe and correct operating procedures implemented to ensure the required quality of all steel reinforcing bars and dowel bars.

9.6 The Supplier shall maintain its own accredited or qualified laboratory to perform QC testing. The Supplier shall provide backup QC testing personnel and any necessary backup laboratory equipment. The QSM shall include the address and telephone numbers of the designated backup personnel. The Supplier's internal designated testing location and/or facility shall meet the minimum accreditations or qualifications obtained through CCRL:

9.7 The QSM shall contain an inventory of the necessary equipment used for sampling and testing along with associated calibration equipment used for each required test procedure. The QSM shall assign a unique identification number to each piece of testing equipment. The QSM inventory for each necessary piece of equipment shall include the following information:

9.7.1 The name of each necessary piece of equipment, date placed in service, manufacturer, model and serial number. The QSM shall include the location where the instructions for use and operation of each necessary piece of equipment is stored if not included in the QSM.

9.7.1.1 For each necessary piece of equipment, the QSM shall include the interval of calibration or verification, a reference to the calibration or verification procedures used, and the location where the current calibration or verification records are stored. The QSM shall describe the methods of calibration and verification procedures that are performed at the specified intervals.

9.7.2 The QSM shall contain a copy of the signed certification that all steel products permanently incorporated into the manufactured product shall have occurred in the United States of America.

10.5 CDOT may perform quality assurance testing.

10.6 CDOT may visit the Fabricator's site when required. CDOT may inspect the operations of

9.8 The QSM shall describe the procedure and frequency for inspection and selection of material samples during production. Sampling shall be performed on a stratified random procedure in accordance with ASTM D 3665. All random QC sample locations shall be properly documented and these procedures shall be included in the QSM.

9.9 The QSM shall contain descriptions and examples of the test report forms used by the Supplier. The QSM shall identify the individuals responsible for maintaining all test records and reports along with the location where the reports are stored.

9.9.1 The test reports shall be maintained and available for inspection for a minimum of three years.

9.10 The QSM shall contain a description of the procedures used to identify and document all material or test results that do not conform to specification requirements. The QSM shall contain provisions for resolving non-conforming material or test results.

9.11 The QSM shall describe procedures used to properly handle, store, and ship steel reinforcing bars and dowel bars.

10. CDOT EVALUATION PROCEDURE

10.1 Suppliers producing steel reinforcing bars and dowel bars shall meet the minimum industry standards.

10.2 Suppliers shall submit the required documentation and samples described in Section 7.

10.3 Within two months after submitting all required information, CDOT will notify the Supplier whether or not the manufacturing facility's application for the Qualified Manufacturer List has been granted.

10.4 CDOT may perform split sample testing in accordance with Section 11.

the Fabricator's facility including those related to shipments if required.

10.5 CDOT will post the Fabricator's name and approved plant on CDOT's Qualified

Manufacturer List (QML) in the web site at www.coloradodot.info/business/APL/.

10.6 Failure in one or more Sections or Subsections listed in this Standard may result in decertification of the plant and the plant will be removed from the QML. The Supplier may apply for reinstatement on the QML.

12.3 If the specification compliance test results do not conform to Subsection 709.01 and 709.03 of the CDOT Standard Specifications, the Fabricator shall remove the non-compliant material from the shipping queue.

11. SPLIT SAMPLE TESTING

11.1 CDOT may request split sample testing. A split sample is a sample taken and evenly divided to be tested by two or more individuals or laboratories. The test results will be exchanged as soon as they are available.

11.2 If the split sample test data is not within the agreed to precision for that particular test a review of both sampling and testing procedures will be conducted by both the Supplier and CDOT.

12. REQUIREMENTS FOR SHIPPING STEEL REINFORCING BARS AND DOWEL BARS BY AN APPROVED FABRICATOR

12.1 The steel reinforcing bars and dowel bars Supplier's QSM as approved by CDOT shall be implemented.

12.2 Each shipment shall be accompanied by two copies of the bill of lading, which shall include:

12.2.1 The name and location of the steel reinforcing bars and dowel bars Fabricator and the Supplier producing the steel reinforcing bars and dowel bars,

12.2.2 The size and grade of steel reinforcing bars and dowel bars conforming to specified specification,

12.2.3 Bars shall be separated and tagged with the Supplier's heat identification number,

12.2.4 The quantity of material shipped,

12.2.5 The date of shipment,

12.2.6 A copy of the mill test reports.